COOLING SYSTEM COMPONENTS, REMOVING AND INSTALLING

GENERAL INFORMATION

NOTE:

- **As the engine warms up, cooling system pressure also increases. If necessary, release pressure before starting repair work.**
- **Hoses are secured with spring clips. When performing repairs, only use spring clips.**
- **VAG 1921 pliers are recommended for installing spring clips.**
- **When installing coolant hoses, route them stress-free, so they do not come into contact with other components (observe markings on coolant connections and hoses).**

Perform cooling system leakage test with VAG 1274 cooling system tester and 1274/9 adapter.

Cooling system components, body side. See **COOLING SYSTEM COMPONENTS, BODY SIDE** .

Cooling system components, engine side. See **COOLING SYSTEM COMPONENTS, ENGINE SIDE** .

Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .

Engine coolant, draining and filling. See **COOLING SYSTEM, DRAINING AND FILLING** .

Engine coolant, mixture ratios. See **RADIATOR, REMOVING AND INSTALLING** .

COOLING SYSTEM COMPONENTS, BODY SIDE

NOTE: The following list refers to items in Fig. 1 .

1. **Radiator**
   - Removing and installing. See **RADIATOR, REMOVING AND INSTALLING**
   - After replacing, replace entire engine coolant
2. **O-ring**
   - Always replace
3. **Coolant hose, upper**
   - Attached to radiator with clip
   - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM**
4. **Retaining clip**

- Make sure it is securely seated

5. **Engine Coolant Temperature (ECT) sensor -G62-**
   - Checking:

     See On Board Diagnostic (OBD)

   - With Engine Coolant Temperature (ECT) sensor -G2-
6. **4 N.m (35 in. lb)**
7. **Cap**
   - Check using VAG1274 tester and VAG 1274/8 adapter
   - Test pressure 1.4 to 1.6 bar
8. **2 N.m (18 in. lb)**
9. **Coolant expansion tank**
   - Perform cooling system leak check using VAG 1274 tester with VAG 1274/9 adapter
10. **Connector**
11. **To cylinder head**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
12. **Air ducting**
13. **10 N.m (7 ft lb)**
14. **Additional fan**
    - Optional equipment
15. **Fan ring**
    - For auxiliary fan
16. **Retaining clip**
    - Make sure it is seated securely
17. **Fan ring**
18. **Coolant fan**
19. **Bracket**
    - For coolant fan connector
20. **Coolant hose, lower**
    - Attached to radiator with clip
    - Coolant hose connection diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
21. **Coolant fan control (FC) thermal switch -F18-**
    - 35 N.m (26 ft lb)
    - For electric fan

    Switching temperatures:

    - Stage 1 ON: 92 to 97° C OFF: 84 to 91° C

- Stage 2 ON: 99 to 105° C OFF: 91 to 98° C

22. **Bracket**
    - For radiator
23. **Bracket**
    - For radiator
    - Note installation position

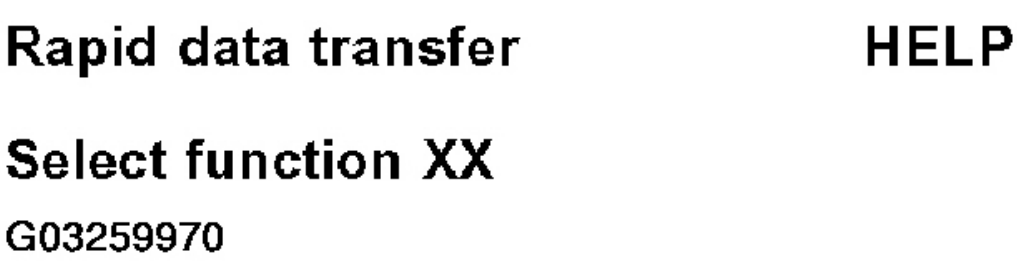


Fig. 1: Exploded View Of Cooling System Components (Body Side)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

COOLING SYSTEM COMPONENTS, ENGINE SIDE

NOTE: The following list refers to items in Fig. 2 .

1. **25 N.m (18 ft lb)**
2. **Coolant pump**
    - Check arm for ease of movement
    - Note installation position
    - Removing and installing: See **COOLANT PUMP, REMOVING AND INSTALLING** .
    - If damaged and leaking replace complete assembly
3. **O-ring**
    - Always replace
4. **EGR cooler**
5. **To expansion tank**
    - Coolant hose connection diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
6. **Coolant hose, upper**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
7. **To cylinder head**

- Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .

8. **To heat exchanger**
   - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
9. **From heat exchanger**
   - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
10. **Coolant pipe**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
11. **10 N.m (7 ft lb)**
12. **To expansion tank, lower**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
13. **EGR cooler supply**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
14. **Connection**
    - With glow plugs -Q7- for auxiliary heater
15. **To top of radiator**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
    - Clipped to bulkhead
16. **O-ring**
    - Make sure it is seated securely
    - Always replace
17. **To bottom of radiator**
    - Coolant hose connections, diagram. See **COOLANT HOSE CONNECTIONS, DIAGRAM** .
18. **Connection**
    - For thermostat
19. **Coolant thermostat**
    - Removing and installing. See **THERMOSTAT, REMOVING AND INSTALLING** .
    - Observe installed position. See **THERMOSTAT, REMOVING AND INSTALLING** .
    - Checking: heat-up thermostat in water
    - Opening starts at 85° C approx.
    - Ends approx. 105° C
    - Opening lift 7 mm minimum
20. **Oil cooler**
    - Removing and installing: See **PART II** (item -3-)

Fig. 2: Exploded View Of Cooling System (Engine Side)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

COOLANT HOSE CONNECTIONS, DIAGRAM

NOTE: The following list refers to items in Fig. 3 .

1. **Radiator**
2. **Oil cooler**
3. **Coolant pump**
4. **Engine block**
5. **Expansion tank**
6. **Intake manifold**
7. **EGR cooler**
8. **Heating system heat exchanger**
9. **Coolant pipe**
10. **Transmission cooler**
    - Vehicles with automatic transmission
11. **Coolant hose, upper**
12. **Coolant hose, lower**

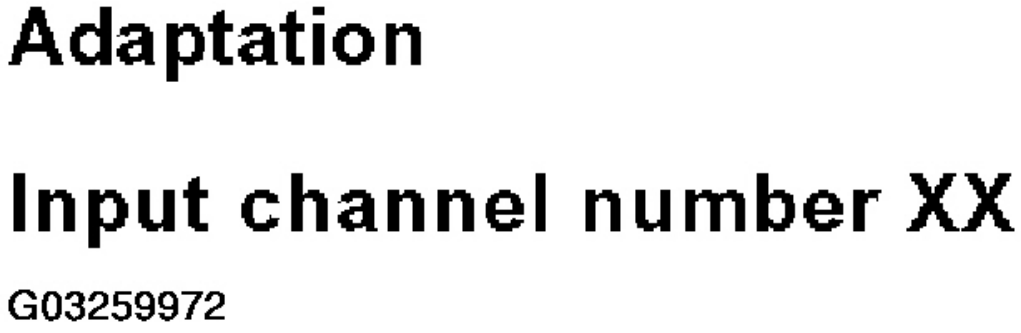


Fig. 3: Identifying Coolant Hose Connections (Coolant Flow Diagram)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

COOLING SYSTEM, DRAINING AND FILLING

Special tools and equipment

- VAG 1306 Drip tray for VAG1202A

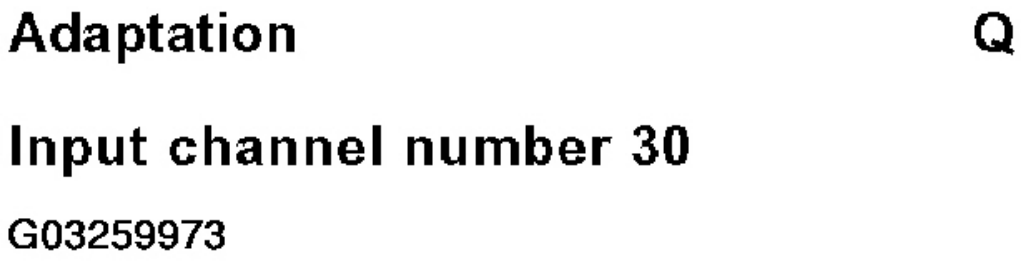


Fig. 4: Identifying Vag 1306 Drip Tray For Vag1202A
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1921 Hose clip pliers
- Anti-freeze tester

Fig. 5: Identifying VAG 1921 Hose Clip Pliers
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Draining

- Remove engine cover.
- Remove cap from coolant expansion tank.
- Remove insulation tray center and left:

  See **PLENUM CHAMBER SEALING ASSEMBLY, REMOVING AND INSTALLING** .

- Unscrew drain plug to drain coolant from radiator (arrow).

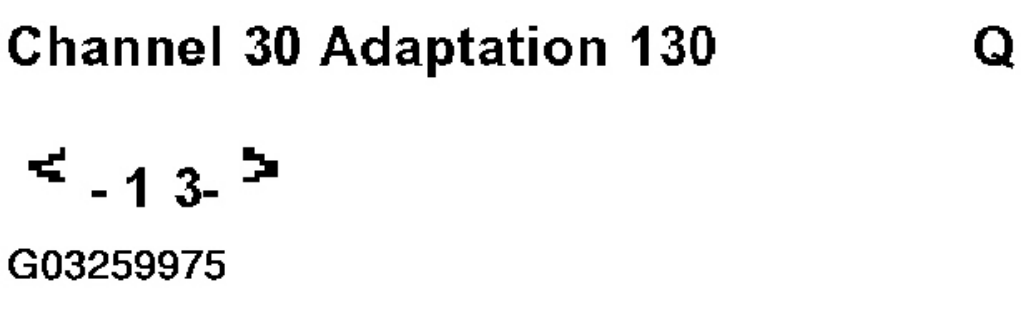


Fig. 6: Locating Radiator Drain Plug
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- To drain coolant from engine also remove coolant hose from oil cooler (arrow).

NOTE: **Observe proper disposal regulations!**

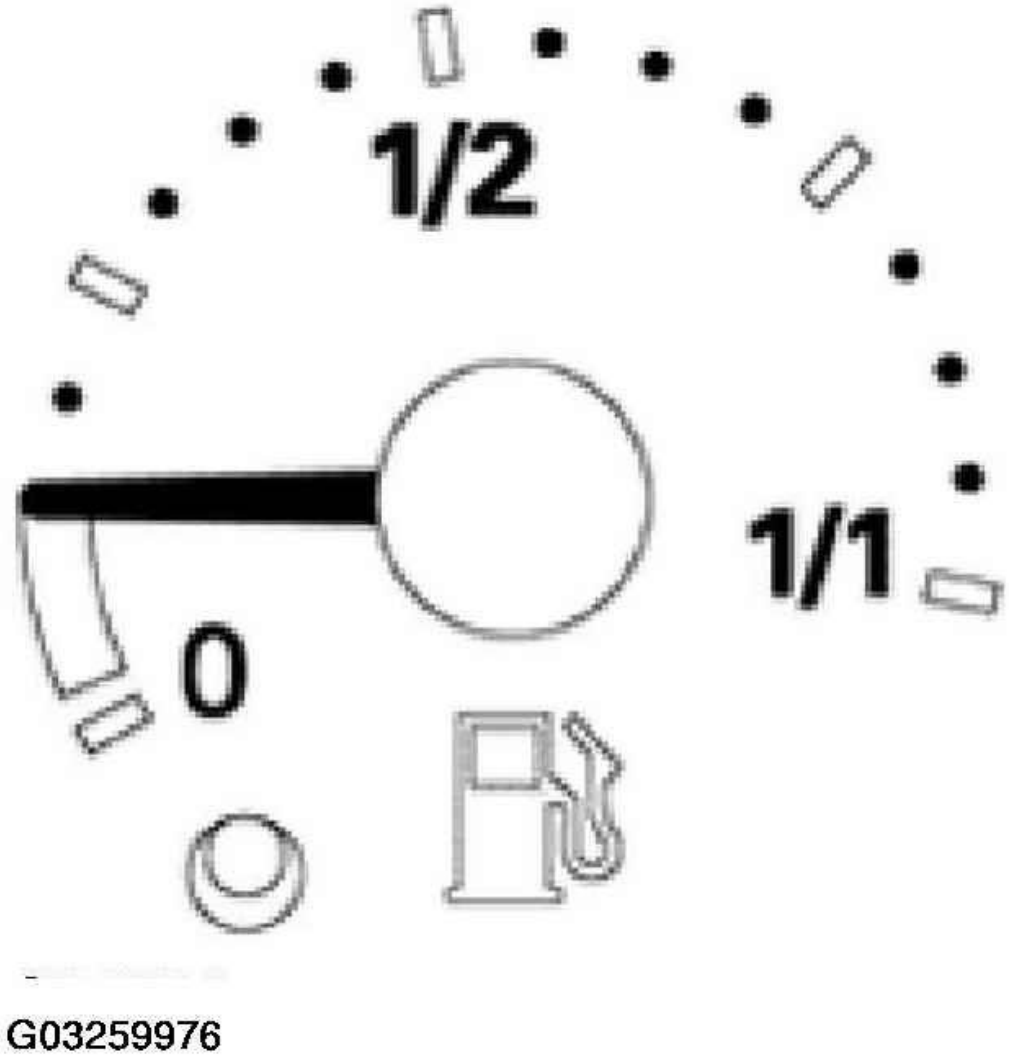


Fig. 7: Removing Coolant Hose From Oil Cooler
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Filling

NOTE:

- **Only use coolant additive G 12 in accordance with TL VW 774 D. Identification: red colored.**
- **On no account must G 12 be mixed with other coolant additives!**

- **If the fluid in expansion tank is brown, G 12 has been mixed with other coolant. In this case the coolant must be changed.**
- **G 12 and coolant additives marked "In accordance with TL VW 774 D" prevent frost and corrosion damage, scaling and also raise boiling point of coolant. For this reason the system must be filled all year round with frost and corrosion protection additives.**
- **Particularly in countries with tropical climates, the coolant due to the higher boiling point improves engine reliability when heavily loaded.**
- **Protected against frost to about -25° C (in arctic climatic countries to about -35° C).**
- **The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40%.**
- **Use clean drinking water when mixing the coolant.**
- **If for climatic reasons a greater frost protection is required, the amount of G 12 can be increased, but only up to 60% (frost protection to about -40° C), as otherwise frost protection is reduced again and cooling effectiveness is also reduced.**
- **If radiator, heat exchanger, cylinder head or cylinder head gasket is replaced, do not reuse old coolant.**

RECOMMENDED COOLANT MIXTURE RATIOS

Frost protection to:	Antifreeze amount	G 12 (1)	Water (1)
-25° C	40%	2.4 ltr.	3.6 ltr.
-35° C	50%	3.0 ltr.	3.0 ltr.
(1) The quantity of coolant can vary depending upon the vehicle equipment.			

- Close drain plug for coolant.
- Fill with coolant up to MAX. mark on expansion tank.

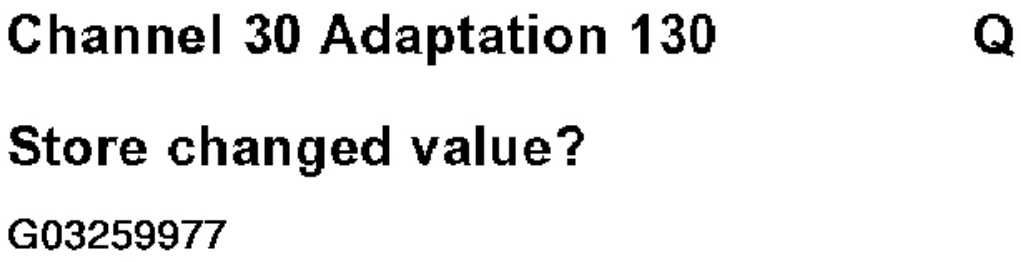


Fig. 8: Identifying Coolant Level Mark
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install coolant expansion tank cap.
- Run engine until radiator fan comes on.
- Check coolant level and top off if necessary.

When engine is at normal operating temperature, coolant level must be on MAX. mark

When engine is cold, coolant level can be between MIN. and MAX. marks.

RADIATOR, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1306 Drip tray forVAG1202A
- VAG 1331 Torque wrench: 5 to 50 N.m (3.7 to 37 ft lb)
- VAG 1921 Hose clip pliers
- Anti-freeze tester

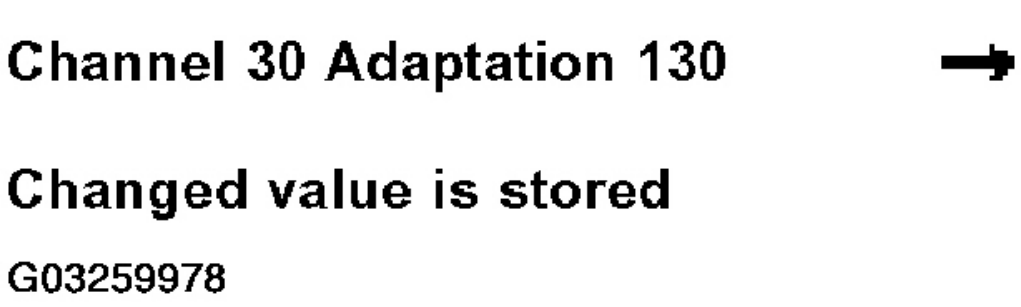


Fig. 9: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Drain coolant. See **COOLING SYSTEM, DRAINING AND FILLING** .
- Remove front panel:

  See **PLENUM CHAMBER SEALING ASSEMBLY, REMOVING AND INSTALLING** .

- Disconnect coolant hoses from radiator.
- Disconnect connectors from thermo-switch.
- Remove ribbed belt tensioner. See **RIBBED BELT TENSIONER, REMOVING AND INSTALLING** .
- Remove radiator mounting bolts and take out radiator.

NOTE: Vehicles with A/C:

- **Observe additional information and removal work. See A/C SYSTEM, ADDITIONAL REMOVAL INFORMATION .**

Installing

Installation is carried out in the reverse order of the removal procedure. Note the following during installation:

Engine coolant, filling. See **COOLING SYSTEM, DRAINING AND FILLING** .

A/C SYSTEM, ADDITIONAL REMOVAL INFORMATION

WARNING: Do NOT open the A/C refrigerant circuit.

NOTE: **To prevent damage to the condenser and to the refrigerant lines/hoses, make sure that the lines and hoses are not stretched, kinked or bent.**

- Remove retaining clamp(s) from refrigerant lines.
- Before removing lock support, fasten radiator to body
- To remove radiator, fasten condenser to the body.

COOLANT PUMP, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1306 Drip tray forVAG1202A
- VAG 1331 Torque wrench: 5 to 50 N.m (3.7 to 37 ft lb)
- VAG 1921 Hose clip pliers
- Anti-freeze tester

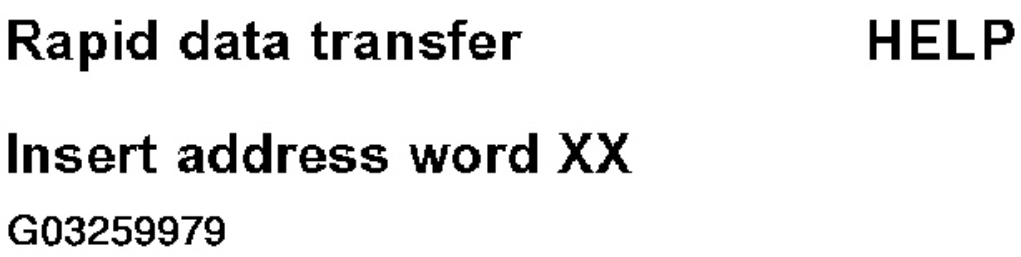


Fig. 10: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

NOTE:

- **Always replace seals and gaskets.**
- **Lower part of the toothed belt guard need not be removed.**
- **Toothed belt should be left in position on the crankshaft sprocket.**
- **Cover toothed belt with a cloth to protect it from coolant before removing coolant pump.**

- Drain coolant. See **COOLING SYSTEM, DRAINING AND FILLING** .
- Remove ribbed belt. See **RIBBED BELT TENSIONER, REMOVING AND INSTALLING** .
- Disconnect fuel supply and return lines at fuel filter.

- Remove connector hose between charge air cooler and intake manifold. See **CHARGE AIR COOLER COMPONENTS, REMOVING AND INSTALLING** .
- Remove fuel filter with bracket. See **FUEL FILTER, SERVICING** .
- Remove belt guard upper and middle sections. See **PART II** .
- Remove V-belt from camshaft sprocket, injection pump sprocket and coolant pump sprocket. See **TOOTHED BELTS, REMOVING, INSTALLING, TENSIONING** .
- Unscrew mounting bolt -1- from pulley -2- and press downward approx. 30 mm.

Fig. 11: Removing Mounting Bolt From Pulley
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Unscrew mounting bolts -3- from coolant pump and carefully remove coolant pump -4- between engine bracket and toothed belt guard.

Installing

Installation is carried out in the reverse order of the removal procedure. Note the following during installation:

- Moisten new O-ring -3- with clean engine coolant.
- Insert coolant pump -4- into engine block and tighten mounting bolts -5- to 15 N.m (11 ft lb).

NOTE: Coolant pump plug points downward.

- Install pulley -2- and tighten mounting bolt -1- (replace). Tightening torque: 40 N.m (30 ft lb) plus additional 90° (1/4 turn).
- Install and tighten toothed belt. See **TOOTHED BELTS, REMOVING, INSTALLING, TENSIONING** .
- Install fuel filter with bracket.
- Disconnect fuel supply and return lines at fuel filter.
- Install ribbed belt. See **RIBBED BELT TENSIONER, REMOVING AND INSTALLING** .

- Install connecting hose between charge air cooler and intake hose. See **CHARGE AIR COOLER COMPONENTS, REMOVING AND INSTALLING** .
- Fill engine with coolant. See **COOLING SYSTEM, DRAINING AND FILLING** .

THERMOSTAT, REMOVING AND INSTALLING

Special tools and equipment

- VAG 1306 Drip tray for VAG1202A
- VAG 1331 Torque wrench: 5 to 50 N.m (3.7 to 37 ft lb)
- VAG 1921 Hose clip pliers
- Anti-freeze tester

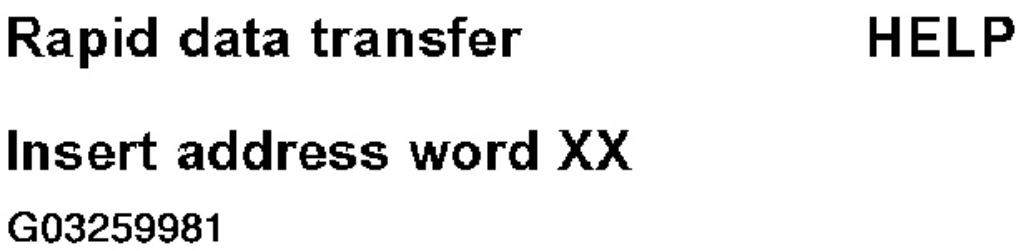
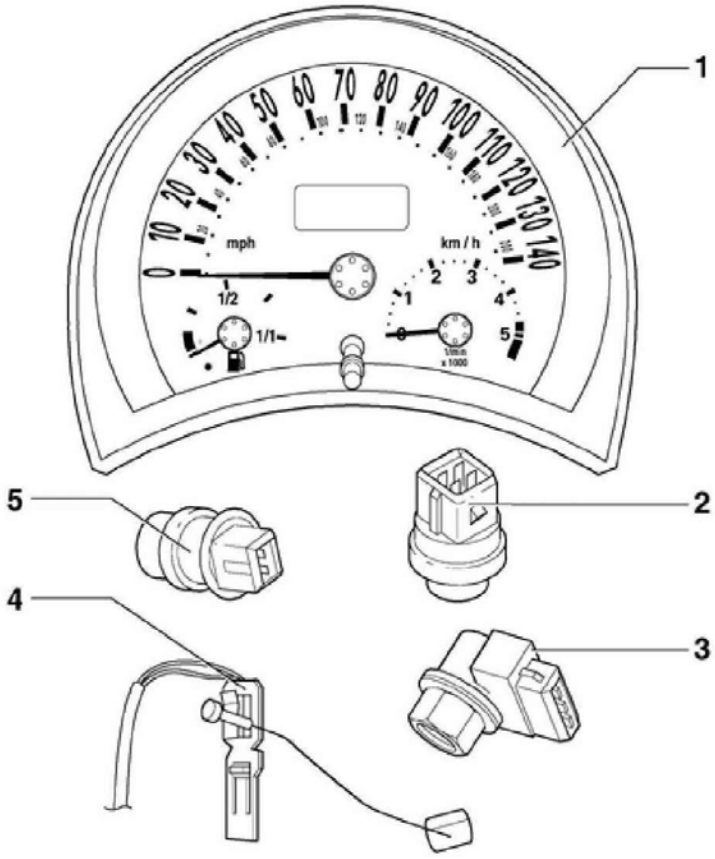


Fig. 12: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

NOTE: Always replace seals and gaskets.

- Drain coolant. See **COOLING SYSTEM, DRAINING AND FILLING** .
- Remove coolant hose from connection -2-
- Unscrew mounting bolts -1- of connection -2- and remove connection -2- along with thermostat -4-.
- Turn thermostat -4- 1/4 turn. (90°)to the left and remove from connection -2-.



1 - Instrument cluster -K-

2 - Engine coolant temperature (ECT) sensor -G2-

3 - Speedometer vehicle speed sensor (VSS) -G22-

4 - Sender for fuel gauge sender -G-

5 - Outside air temperature sensor -G17-

Fig. 13: Removing Thermostat
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

Installation is carried out in the reverse order. Note the following during installation:

- Moisten new O-ring -3- with coolant.
- Insert thermostat -4- in connection -2- and turn 1/4 turn (90°) to right.

NOTE: The brace on the thermostat must be almost vertical.

- Install thermostat -4- into engine block.
- Tighten mounting bolt -1- to 15 N.m (11 ft lb).
- Fill engine with coolant. See **COOLING SYSTEM, DRAINING AND FILLING** .